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(71) Applicants
Barry James Arnold
6 Londons Close, Upminster, Essex, RM14 2DU, United Kingdom

Martin Hewitt
4 Parc Bryn Castell, Wepre Lane, Connah's Quay, Deeside, Clwyd, United Kingdom

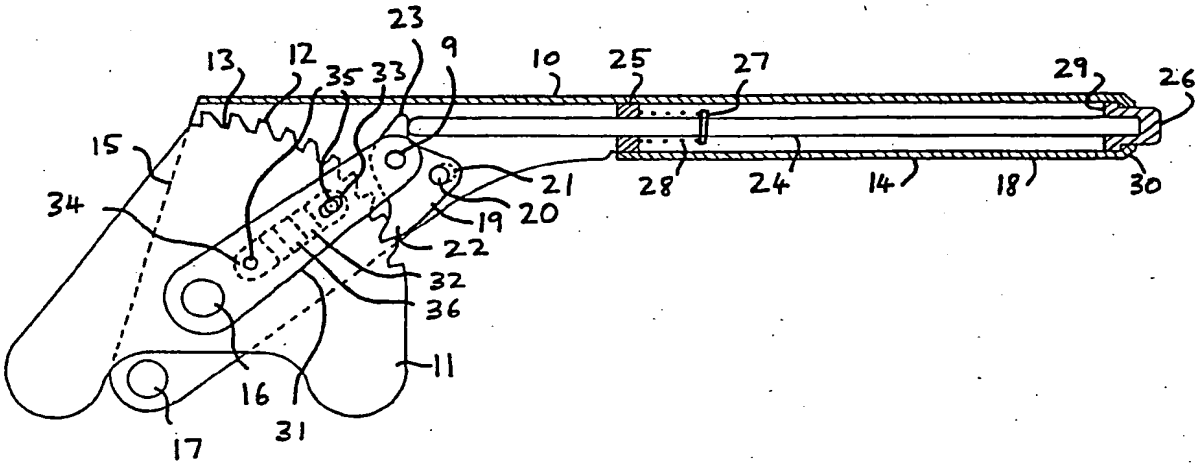
Anthony Barnett
73 Leicester Road, Failsworth, Manchester, M35 0GW, United Kingdom

(72) Inventors
Barry James Arnold
Martin Hewitt
Anthony Barnett

(74) Agent and/or Address for Service
Withers & Rogers
4 Dyer's Buildings, Holborn, London, EC1N 2JT, United Kingdom

(54) An engagement mechanism e.g. for vehicle handbrake levers

(57) The engagement mechanism comprises ratchet teeth (12) on a plate (11) and a pawl (19) mounted in a housing part (15) of the handbrake lever (14). The lever (14) is pivotally mounted on the plate (11) so that the pawl (19) is arranged to move along a path adjacent the ratchet teeth (12). A friction element (36) engages the plate (11) during pivotal movement of the lever (14) and is connected to the pawl (19) so that the pawl (19) engages the ratchet teeth 12 on downward movement of the lever (14) but is pivoted away from contact with the ratchet teeth (12) on upward movement of the lever (14) to prevent noise and wear when the lever (14) is pulled up without first depressing the release button (26).



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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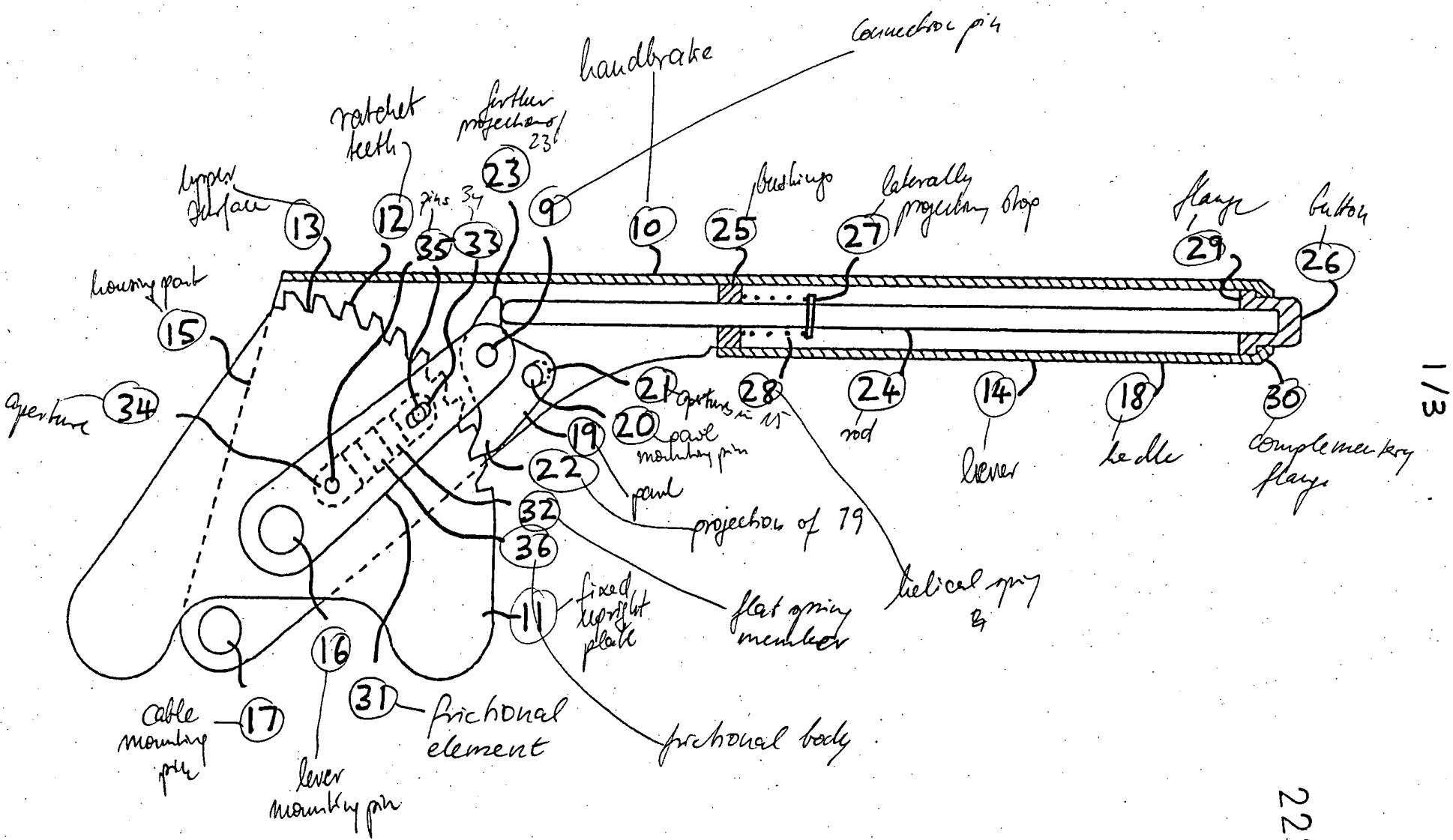

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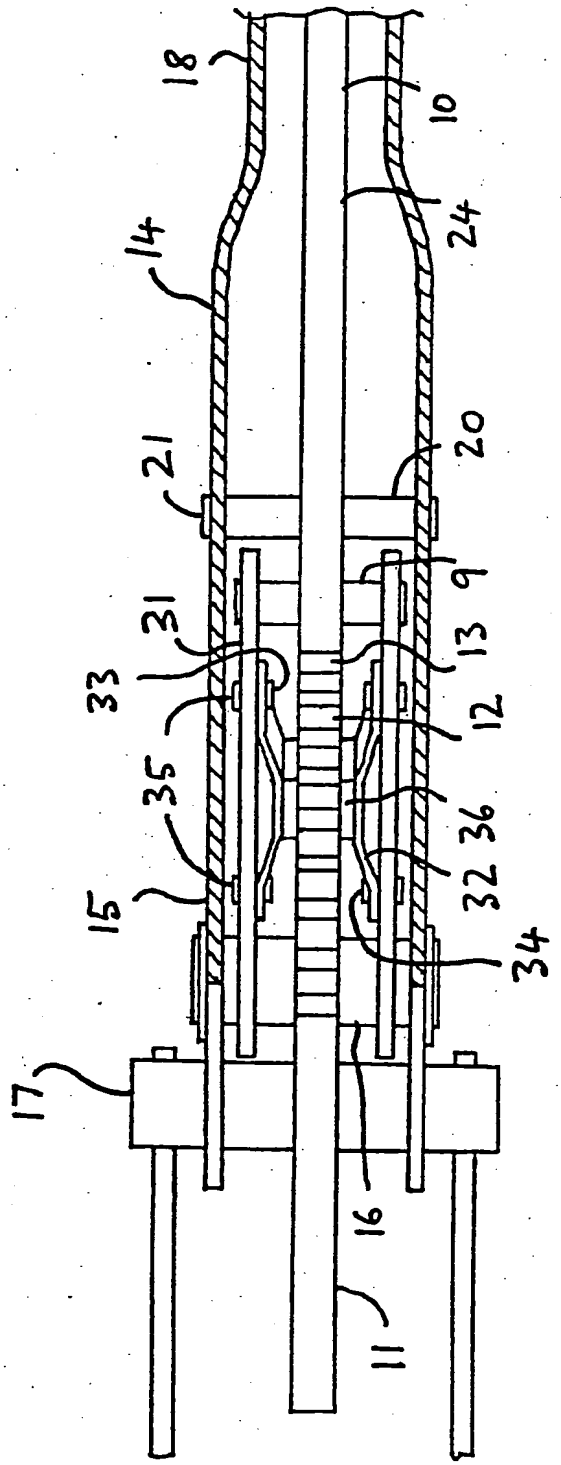

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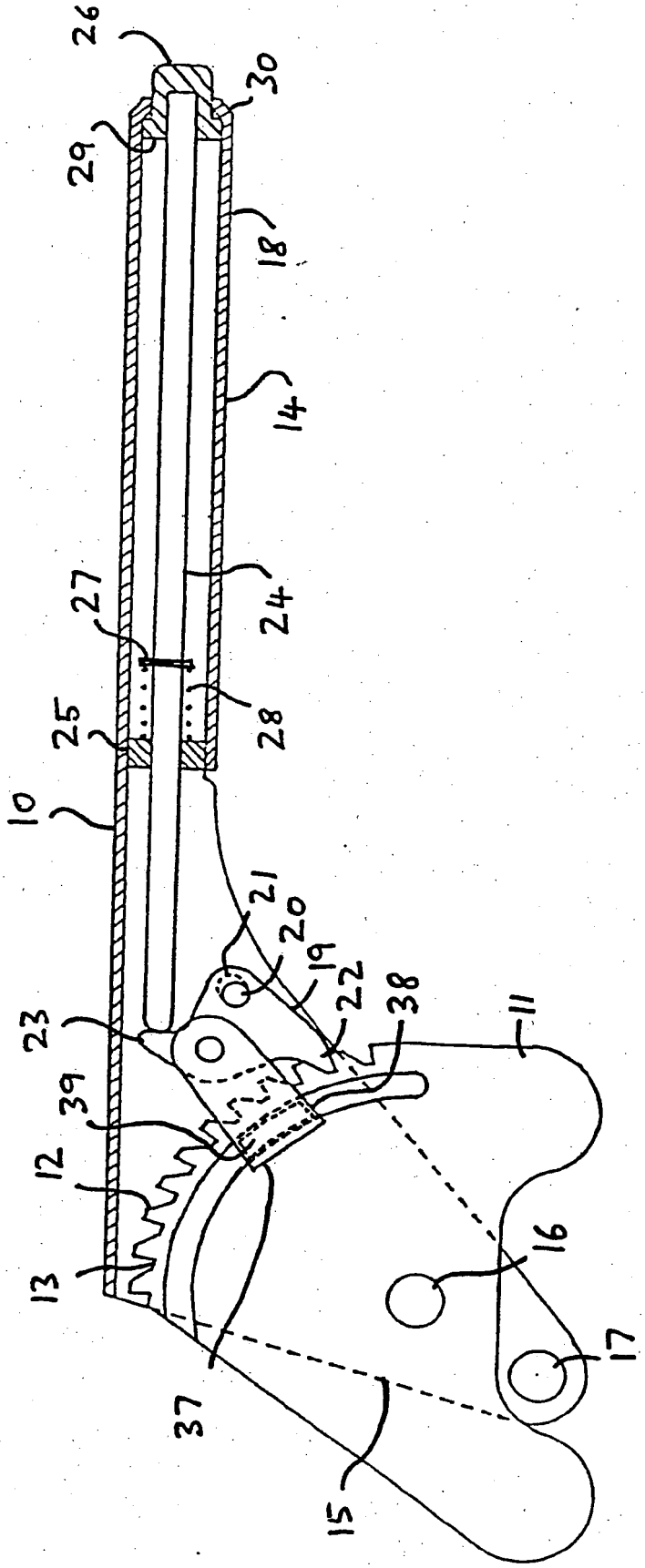

AN ENGAGEMENT MECHANISM

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The invention relates to an engagement mechanism and particularly, but not exclusively, to an engagement mechanism for use in a handbrake in a vehicle.

An example of a known engagement mechanism is the locking mechanism in a conventional vehicle handbrake. When the handbrake lever is raised to operate the brakes, a pawl engages between the teeth of a ratchet to prevent downward movement of a lever to release the brakes. The pawl may be disengaged from the teeth by means of a manually operated button on the end of the lever which is fast with a spring loaded push rod which engages the pawl. When the lever is raised without the button being depressed, the pawl, being biased against the ratchet teeth by the spring loaded push rod to which it is attached, "clicks" over the ratchet teeth making a noise which may be undesirable. The engagement of the pawl with the teeth when the handbrake lever is raised also results in wear of the teeth.

According to one aspect of the invention there is provided an engagement mechanism comprising a pair of engagement members arranged to move relative to one another on adjacent fixed paths and means arranged to bring the engagement members into engagement solely in response to relative movement in one direction and to prevent the engagement members from engaging solely in response to relative movement in an opposite direction.

Thus, an engagement mechanism is provided in which two engagement members do not engage when moved in one direction relative to one another, but do engage, for example to lock, when moved in an opposite direction. Thus, for example, in a

handbrake, the brake lever may be raised without engagement of the ratchet and pawl, but may be locked in the raised position by movement to lower the lever. The noise and wear from engagement of the pawl with the ratchet on raising of the lever are thus eliminated.

The means preferably includes a friction element which frictionally engages a friction part of the mechanism during said relative movement to operate the means. By the use of frictional engagement, a large movement of one element can be translated into a small movement of another combined with sliding.

Preferably the means acts by moving a movable one of the engagement members into and out of an engagement position.

The means may move the movable engagement member in any suitable manner, such as, for example, translationally, but preferably moves it pivotally. Preferably the friction element is mounted on the movable engagement member. Thus the said relative movement of the engagement members will cause the friction element, through its frictional engagement with a friction part of the mechanism, to exert a force on the movable engagement member to cause it to move into the engagement position.

The friction element may comprise a bogie mounting at least one frictional body arranged to engage the said other engagement member.

The said fixed paths may be straight lines, but preferably are concentric circular paths. Preferably the movable engagement member is at a greater distance from the centre of the circular paths than the other engagement member. Preferably, the centre

of the circular paths lies on a centre part of the mechanism which is fast with the other engagement member and the friction element is pivotally connected to said centre part at said centre of the circular paths and is pivotally connected to the movable engagement member. Thus the movable engagement member is pivotally mounted and the friction element is pivotally connected to both the movable engagement member and the other engagement member. In order to permit pivotal movement of the movable engagement member, one of the pivot joints in this system must be able to move radially. Preferably the movable member is mounted for limited radial movement with respect to the circular paths.

The friction part of the mechanism may be the centre part of the mechanism. Thus, the frictional engagement would be at a pivotal point of the frictional element. Preferably, however, the frictional element frictionally engages the other engagement member. The frictional element may include a resiliently mounted frictional body which is in frictional engagement with the other engagement member. The force of the frictional engagement of the frictional body with the other engagement member is preferably adjustable. Thus, the mechanism can be used in systems requiring different frictional forces and the frictional forces in a mechanism can be adjusted in use, for example, to compensate for wear of the frictional body. Preferably the frictional body is biased against the other engagement member by a spring and the force exerted by the spring is adjustable.

Preferably the engagement of the engagement members prevents further relative movement of the engagement members in said one direction so that the mechanism acts in a non-return fashion. Preferably means are

provided for disengaging the engagement members to allow relative movement thereof in said one direction.

Preferably the movable engagement member is a pawl and the other engagement member is a ratchet.

According to another aspect of the invention there is provided a handbrake including a mechanism as described in relation to the first aspect of the invention.

More particularly in accordance with this preferred aspect of the invention there is provided a vehicle handbrake comprising a housing, a handbrake lever movable relative to the housing, unidirectional means, including a pair of interengageable members one on the housing and one on the handbrake lever, operative to allow movement of the handbrake lever in one direction and to prevent movement of the handbrake lever in the other direction, and means associated with one of the interengagable members for automatically moving the one member away from the other member in response to movement in the one direction to provide disengagement during such movement.

Two embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Fig.1 is an elevation in cross-section of the first embodiment,

Fig.2 is a fragmentary plan view in cross-section of one longitudinal half of the first embodiment, and

Fig.3 is an elevation in cross-section of the second

embodiment.

Figs.1 and 2 show a first embodiment comprising a handbrake 10 for use in a vehicle. A fixed upright plate 11 includes ratchet teeth 12 on an upper surface 13 thereof. A lever 14 includes a housing part 15 which extends on either side of the plate 11 as an open sleeve and is pivotally mounted thereto by a lever mounting pin 16 extending through the plate 11 and both sides of the housing part 15.

At the lower end of the housing part 15 a cable mounting pin 17 is provided which is connected to a cable (not shown) which operates the brakes of the vehicle (not shown). Opposite the cable mounting pin 17 with respect to the lever mounting pin 16 is an elongate cylindrical handle part 18 of the lever 14. Thus, raising of the handle 18 results in pivoting of the lever 14 about the lever mounting pin 16 so that the cable is pulled to operate the vehicle brakes.

A pawl 19 is pivotally mounted in the housing 15 on a pawl mounting pin 20 extending through the pawl 19 and apertures 21 in both sides of the housing 15. The apertures 21 are elongate in the radial direction with respect to the lever mounting pin 16 so that the pawl 19 is mounted for limited radial movement. It is envisaged that the apertures may be elongate in another direction. The pawl 19 includes a projection 22 which is arranged to engage with the ratchet teeth 12. The pawl 19 includes a further projection 23 which is arranged to be engaged by a rod 24 supported for axial movement in the handle 18 of the lever 14.

The rod 24 is journalled in bushings 25 mounted in the end of the cylindrical handle 18 adjacent the

housing 15 and is connected to a button 26 journalled in the handle 18 at the opposite end thereof. The rod 24 includes a laterally projecting stop 27 for a helical spring 28 which surrounds the rod 24 and abuts the stop 27 and the bushings 25. The spring 28 biases the rod 24 away from the housing 15. The button 26 includes a flange 29 which is biased into abutment with a complementary flange 30 on the handle 18 by the spring 28.

A frictional element 31 is pivotally connected to the pawl 19 by a connection pin 9 and is also pivotally connected to the lever mounting pin 16. The frictional element 31 includes a flat spring member 32 having apertures 33, 34 at each end for pins 35 mounting the spring member 32 on the frictional element 31. The spring member 32 is mounted so as to be bowed and to bias a frictional body 36 mounted on the spring member 32 against the side of the plate 12 in frictional engagement therewith. One of the apertures 33 is elongate so that the degree of frictional force exerted by the frictional body 36 mounted on the spring member 32 can be adjusted.

In use the handle 18 is raised without depression of the button 26. The lever 14 exerts a force on the pawl 19 through the pawl mounting pin 20, and the pawl 19 in turn exerts a force on the frictional element 31 through the connection pin 9. The frictional element 31, through the frictional engagement of the frictional body 36 with the side of the plate 11, resists the force and causes the pawl 19 to pivot and the pawl mounting pin 20 to move radially in the apertures 21 so that the pawl projection 22 no longer contacts the ratchet teeth 12.

Once the handle 18 has been raised so that the brakes are operated, the handle 18 is released and the tension in the cable exerts a force to return the handle 18. The movement of the lever 11 in response to this force will cause the mechanism movement described above to occur in reverse, as the frictional force on the frictional element 31 will be in the opposite direction. Thus, the pawl 19 will be brought into engagement with the ratchet teeth 12 and the lever 14 will be locked with the brakes of the vehicle applied.

The handle 18 may be lowered by depressing the button 26 which will move the rod 24 axially so that it engages the pawl projection 23 and pivots the pawl 19 out of engagement with the ratchet teeth 12.

The frictional element 31 need not be provided with a spring 32 and a frictional body 36, but the frictional force may be provided by frictional engagement of the friction element 31 with the lever mounting pin 16 which may be fast with the plate 11.

A frictional element 31 may be provided on one or both sides of the plate 11.

Fig.3 shows a second embodiment. A handbrake 10 is identical to that of the first embodiment, but the frictional element 31 is replaced by a bogie 37 on which is rotatably mounted pawl 19. The bogie 37 has arms 38 extending on either side of the plate 11, the arms 38 mounting pads 39 arranged to engage the sides of the plate 11 to provide the frictional force. The pads move in arcuate grooves 40 defined by opposite faces of plate 11. Alternatively, each pad may move against an arcuate lip formed on the surface of the plate. The handbrake 10 thus operates in the same manner as in the first embodiment.

The required frictional force to pivot the pawl 19 need not be provided by the mechanisms shown but may be provided in any suitable manner.

The friction body 36 need not be mounted on a spring member 32 but may be mounted directly on the frictional element 31. For example, the frictional force may be provided by a resiliently biased ball carried by an arm of the bogie 37, which bears against plate 11.

The pawl 19 need not be in the shape as shown but may be of any suitable shape.

The mechanism need not be used in a handbrake for a vehicle, but may be used in any appropriate apparatus.

CLAIMS

1. An engagement mechanism comprising a pair of engagement members arranged to move relative to one another on adjacent fixed paths and engage means arranged to bring the engagement members into engagement solely in response to relative movement in one direction and to prevent the engagement members from engaging solely in response to relative movement in an opposite direction.

2. An engagement mechanism as claimed in claim 1, wherein the engage means includes a friction element which frictionally engages a friction part of the mechanism during said relative movement to operate the engage means.

3. An engagement mechanism as claimed in claim 2, wherein the engage means acts by moving a movable one of the engagement members into and out of an engagement position.

4. An engagement mechanism as claimed in claim 3, wherein the engage means acts by moving the movable engagement member pivotally.

5. An engagement mechanism as claimed in claim 3 or claim 4, wherein the friction element is mounted on the movable engagement member.

6. An engagement mechanism as claimed in claim 5, wherein the said fixed paths are concentric circular paths.

7. An engagement mechanism as claimed in claim 6, wherein the movable engagement member is at a greater distance from the centre of the circular paths than the other engagement member.

8. An engagement mechanism as claimed in claim 5, 6 or 7, wherein the friction element comprises a bogie mounting at least one frictional body arranged to engage the said other engagement member.

9. An engagement mechanism as claimed in claim 7, wherein the centre of the circular paths lies on a centre part of the mechanism which is fast with the other engagement member and the friction element is pivotally connected to said centre part at said centre of the circular paths and is pivotally connected to the movable engagement member.

10. An engagement mechanism as claimed in claim 9, wherein the movable member is mounted for limited radial movement with respect to the circular paths.

11. An engagement mechanism as claimed in claim 9 or claim 10, wherein the friction part of the mechanism is the centre part of the mechanism.

12. An engagement mechanism as claimed in any of claims 3 to 11, wherein the friction element frictionally engages the other engagement member.

13. An engagement mechanism as claimed in claim 12, wherein the force of the frictional engagement of the frictional body with the other engagement member is adjustable.

14. An engagement mechanism as claimed in claim 12 or claim 13, wherein the frictional element includes a resiliently mounted frictional body which is in frictional engagement with the other engagement member.

15. An engagement mechanism as claimed in claim 14, wherein the frictional body is biased against the other engagement member by a spring.

16. An engagement mechanism as claimed in any of claims 3 to 15, wherein the movable engagement member is a pawl and the other engagement member is a ratchet.

17. An engagement mechanism as claimed in any of claims 3 to 16, wherein the engagement of the engagement members prevents further relative movement of the engagement members in said one direction so that the mechanism acts in a non-return fashion.

18. An engagement mechanism as claimed in claim 17, wherein disengage means is provided for disengaging the engagement members to allow relative movement thereof in said one direction.

19. A handbrake including an engagement mechanism as claimed in claim 18 such that the engage means is arranged to lock the handbrake on and the disengage means is arranged to release the handbrake.

20. A handbrake substantially as hereinbefore described with reference to Figures 1 and 2 or Figure 3 of the accompanying drawings.

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